Challenges in Engineering Education at the University of the Philippines-Diliman

Sheree Ann T. Pagsuyoin[a,*], Dina Marie B. Delias[b]

[a]*Department of Chemical Engineering, University of the Philippines, Diliman, Quezon City, PHILIPPINES.*
[b]*Department of Political Science, University of the Philippines, Diliman, Quezon City, PHILIPPINES.*

Abstract

The College of Engineering of the University of the Philippines-Diliman Campus was founded in 1910 and currently has eight departments offering a total of twelve undergraduate courses. On the average, over three thousand students are enrolled each year. In the college, teaching methods have evolved from relying on chalks and boards to incorporating software and computer-based learning to the curriculum. As part of the program on improving teaching effectiveness, professional development and teaching skills enhancement workshops are provided for the faculty. Linkages with the industry are being strengthened to provide more avenues for research funding and undergraduate/graduate employment. Effort is exerted in promoting interest in engineering following decline in student population over the past five years and the increasing engagement of graduates in non- engineering fields after graduation. Course curriculum revisions are focused on responding to demands for more globally competitive and well-rounded engineers.

Keywords: teaching effectiveness, personnel development, curriculum

1. Background

The University of the Philippines (UP) is the premiere state university of the Philippine Republic. Of its seven campuses throughout the country, two are offering courses in Engineering. The College of Engineering in the Diliman Campus offers twelve undergraduate degree programs that, with the exception of Computer Science, can be completed in five years. From its modest beginnings in 1910, the college now consists of several buildings spread out in different areas of the Diliman Campus. It has several computer laboratories that are used for both instruction and research. Most major subjects are offered on a seasonal basis (once per academic year). This translates to a one-year delay in the program completion for a major subject failed in a semester. In previous years, only general engineering courses were offered during the summer. Lately, some departments have started to offer off-season major subjects during the regular semester and summer if there is a petition from the students, subject to the availability of resources (faculty and laboratory).

2. Objectives

The objectives of this paper are as follows:

- to highlight the improvements/development in teaching facilities, personnel development, and student curriculum in the College of Engineering, UP-Diliman
- to identify problems and challenges related to engineering education in the undergraduate level of UP-Diliman
- to identify the strength and weaknesses of the proposed and on-going measures to address these problems.

3. Methodology

Primary and secondary data were gathered from different offices of UP-Diliman. These include the following: student enrolment, profile, and academic performance; faculty profile; inventory of laboratory facilities and equipment/software update; non-academic activities and programs for undergraduates; personnel development program for the faculty; and on-going and proposed academic activities in the college. From these data, profiles of the financial & research support for the faculty and the career assistance program for students were made. The specific objectives and goals of

* *Corresponding author. Email: stpagsuyoin@up.edu.ph*

curriculum revisions and academic programs were analyzed in terms of their strengths and weaknesses.

4. Results and Discussion

4.1 Student Development

The majority of the student populace at the UPD College of Engineering come from science high schools. In the first semester of AY 2005-2006, 38% of the enrollees were from the three prominent science high schools in Metro Manila. In the same semester, the most number of enrollees were from the department of chemical engineering (18%), followed by the departments of industrial (13.1%) and civil engineering (12.5%).

Between 1995 and 2000, enrolment grew steadily, with the highest growth rate of 19.6% in the school year 1995-1996 (Table 1). However, in the last five years (2001-2005), the enrolment rate has seen constant decline, averaging at about 6%. If this trend continues, by 2010 the enrolment figures would have been less than they were in 1995.

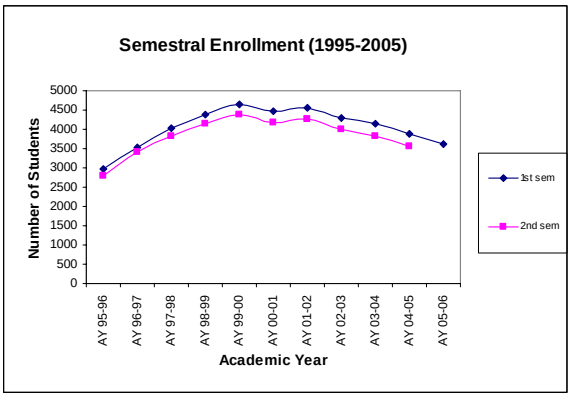

Figure 1. Enrolment Data at the UPD College of Engineering

In response to the declining enrolment rate, the college launched intensive promotional tours to high schools across the country. This project, called Engineering Road Show, showcases the achievements of the alumni engineers from the college, and provides HS students a visual overview of the different engineering degree programs. As this project is intended to increase freshmen enrolment, the results of the effort will only become evident during the first semester of next year.

The college administration and the student council jointly instituted the student-teacher dialogue to serve as a venue for communication between the teaching personnel and the students. In these regular forays, students are given the chance to air their grievances and concerns to the faculty. The faculty in turn responds to the issues raised by the students. The dialogues are also an avenue for discussion of the department's plans and proposed projects to the student audience.

To closely monitor academic progress, the department of geodetic engineering is planning to assign permanent faculty advisers to its undergraduates. Individual flowcharts will be constructed to easily map out the academic status and direction of each student. Professors also involve interested undergraduates in their researches, usually as assistants. In addition to the hands-on experience, the students are also given financial compensation.

As a form of career assistance to the students, the college's student council also instituted linkages to the industry thereby providing internship opportunities to junior students and potential job offers to graduating students. Annually, private companies converge for the week-long job fair held near the end of the second semester. Potential candidates are screened and interviewed for possible hiring as trainees or permanent employees.

Undergraduate research competitions are also held annually, with increasing monetary support from outside institutions. More career assistance programs for undergraduates and joint research ventures of the faculty are organized in partnership with private and government agencies

The course curriculum of some undergraduate programs is in the process of review and revision. In the current curriculum, courses that specifically address the needs of the processing and manufacturing industries are often offered as special courses. These demand-driven courses are generally classified as electives and are not compulsory in the program completion. The curriculum evaluation process seeks to address the relevance of the course contents and re-align courses to include more research requirements.

4.2 Improvement of Facilities and Other Resources

Despite suffering an annual budget cut, the departments have managed to acquire a significant number of new and modern laboratory equipment and software packages over the last decade. The departments of engineering sciences, chemical engineering, mechanical engineering, and geodetic engineering upgraded their laboratories to include more modern equipment and phase out non-functional and outdated equipment. The Remote Sensing and GIS laboratories were renovated and equipped with wi-fi. Renovation of the laboratories in other

departments is also either in-progress or in the planning stages.

The college also aggressively pursues the upgrading of the lecture rooms through the *endowed room* concept. In essence, an endowed room is classroom complete with instructional facilities such as multi-media projectors and white board panels, and has improved ventilation and newer utilities. Rooms are named after the corporation or individual who funded the renovation of the classroom.

In addition to infrastructure improvement, the college also seeks to update and increase its information technology resources. Currently, enlistment in subjects is done on-line and students are provided with easy access to internet and on-line journals. Likewise, the faculty can also submit grades on-line through the same procedure. The on-line data processing significantly reduces the paperwork during regular enrolment and submission of grades.

4.3 Faculty Progress and Development

A study of the profile of the resignations filed in the last five years (2000-2005) reveals that turnover is highest at the instructor level (junior teaching position). Data shows that faculty on an average stay for a period of three and a half years before filing for resignation. More often than not the reason cited for leaving the academe is to pursue higher studies, to take on a career in an engineering company or seek out non-academic opportunities, and in several instances faculty went on Absence Without Leave and thus dropped from the rolls.

In order to address this major issue in the University, the college provides support especially to the junior faculty members to finish their graduate studies. The college provides free tuition fee for faculty members who are enrolled in the University Graduate Program. Fellowships are also available, and there are University based grants that shoulder partial and full expenses for the pursuit of graduate degrees. The college also takes on an active role in coordinating and arranging for grants and scholarship abroad for the faculty.

More importantly, there is close collaboration between the senior faculty members who provide mentoring especially in various research areas for the younger faculty. There are also personal development and teaching effectiveness workshops that are offered.

Lately as the University has implemented more stringent tenure rules for the faculty members, the measures mentioned above hope to bridge faculty status and the required standards of the college.

4.4 General Observations

The dwindling enrolment in the college affects both the quality and quantity of the students. Originally, restrictions in the acceptance to a degree program guaranteed that only the ones with highest marks in the entrance exams may pursue the programs. The promotional campaign is one way of revitalizing the interest in engineering but there may be a need to re-evaluate the student quota for each degree program in order to maintain student quality. Nowadays, survival in the college is aided by support groups that conduct remedial classes to students who can hardly cope with the pace of the lessons.

The career assistance program aimed at bringing jobs nearer to students is a positive undertaking. However, only very few students get the opportunity to work for the participating companies due to the limited slots available. Many graduates find jobs that are unrelated to engineering in places such as such as tutorial and call centers. The college should thus pursue increased linkages with the industry not only to seek funds for faculty research but also to assist its graduates in securing jobs and internships.

The curriculum revisions that are being undertaken by some departments should consider that engineering is a dynamic field, and every year there are numerous technological advances achieved in many parts of the world. The degree programs should see to it that the course offerings not only address the fundamentals of engineering but also keep abreast and even anticipate the development in the field of engineering. The theoretical part of learning should be accompanied by hands-on experience in the laboratories. The upgrade of facilities and the IT-related development are valuable in the achievement of this goal. The renovation of the laboratories is only a start in the modernization of the available research facilities. Many new equipment still need to be procured but funds are scarce and may likely be limited to smaller and cheaper equipment.

5. Conclusions

Based on the data gathered from the College of Engineering in the University of the Philippines in response to the challenges in engineering education, it has implemented various programs and developments in the areas of personnel, facilities, and student recruitment. It has implemented programs to address the increasing

drop in student enrolment, the high turn over of junior faculty members, and the need to upgrade its facilities.

For the decreasing student enrolment the college has taken on a proactive national recruitment program for high school students to apply for Engineering Degrees, but this has been too recently instituted to be assessed. It has also instituted an open system for continuous dialogues between faculty and students in the college for the purpose of improving teaching in the College. And there are also mentoring program for students as well as programs to assist prospective graduates for engineering careers after graduation.

The review of the curriculum to ensure its continued relevance to the social context is an on-going project. And the facilities have also been improved and upgraded. There are notable sustained efforts have been put into addressing other facility needs in coordination not only with University authorities but with external sources as well.

Finally, to respond to the faculty turn over in the junior level, financial and research assistance has been provided and fostered between and among the junior and more senior faculty members.

These programs, on the whole are potentially beneficial but most of them have only just recently been implemented. However, the improvements in facilities and the linkages with the engineering industries have provided benefits that help the college retain its global competitiveness.

Biographical information

DINA MARIE B. DELIAS is currently a candidate of the Ph.D. program in Political Science at the University of the Philippines. She also a Teaching Fellow at the Department of Political Science in the same University.

SHEREE ANN T. PAGSUYOIN is an assistant professor of environmental and chemical engineering at the College of Engineering, University of the Philippines-Diliman, where she has been teaching for the past six years.